

Mathematics Department
Princeton University – Fine Hall
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Education

PhD in Mathematics, Rice University, Advisor: William A. Veech, 2011.
BS in Computer Science & Mathematics, University of Texas at Dallas, 2006.

Employment

Associate Research Scholar, Princeton University, 2017 – present.
Senior Lecturer, Princeton University, 2015–2017.
Instructor, Princeton University, 2011–2015.

Industry Experience

Consulting Research Staff Member, 2016 – present.
Institute for Defense Analysis - Center for Computing Sciences
Full time researcher during SCAMP 2016, June – August 2016.
Full time researcher during SCAMP 2017, June – August 2017.

Clearance: SCI with polygraph

Internal Publications:

- 2 papers from SCAMP 2016
- 1 paper from SCAMP 2017
- 1 additional paper
- 1 paper in progress

Research Interests

Interval Exchange Transformations, Rauzy Classes, the Teichmüller Geodesic Flow, Symbolic Dynamics and Low-Complexity Systems.

Publications

Self-Inverses In Rauzy Classes, PhD thesis, Rice University.

Self-Inverses, Lagrangian Permutations and Minimal Interval Exchange Transformations with Many Ergodic Measures, Communications in Contemporary Mathematics, 16(01):1350019, 2014.

Topological mixing for some residual sets of interval exchange transformations, joint with Jon Chaika, Communications in Mathematical Physics, 333(1):483-503, 2015.

A Combinatorial Proof of the Kontsevich-Zorich-Boissy Classification of Rauzy Classes, Discrete and Continuous Dynamical Systems - series A, 36(4):1983-2025, 2016.

On the Number of Ergodic Measures for Minimal Shifts with Eventually Constant Complexity Growth, joint with Michael Damron, Ergodic Theory and Dynamical Systems, 37(7):2099-2130, 2017.

On Rauzy Induction: An Answer to Bufetov's General Question, Bulletin de la Société Mathématique de France, accepted.

Preprints

Primitive substitution systems and their ergodic properties, with Kelly Yancey (in preparation).

Unnamed project on Ergodic Measures, with Michael Damron (in preparation).

Unnamed project on Generic Measures (in preparation).

Labeled and Non-labeled Extended Rauzy Classes.

On Rauzy Induction: An Effective Answer to Bufetov's Question (in preparation).

Awards

250th Anniversary Fund for Innovation in Undergraduate Education, Princeton University, 2016.
 250th Anniversary Fund for Innovation in Undergraduate Education, Princeton University, 2017.
 Junior Faculty Teaching Award, Princeton Mathematics Department, 2013.
 East-DeMarco Fellow, Rice University 2011.
 Tracy Thomas Fellow, Rice University, 2010-2011.
 VIGRE Fellow, Rice University, 2008-2010.
 Rice Fellow, Rice University, 2006-2008.

Departmental Service

Assistant advisor to undergraduate majors, 2015 – present.
 Junior Faculty Teaching Award Committee, 2015 & 2016.
 Organizer and Co-chair, Ergodic Theory and Statistical Mechanics Seminar, Princeton University,
 Spring 2012–Present.

Academic Service

Mathematical Reviews for MathSciNet, 2016 – present.
 Referee: Annales de l'Institut Fourier, Journal of the European Mathematical Society, Discrete
 and Continuous Dynamical Systems, Journal d'Analyse Mathématique, Journal of Modern
 Dynamics

Conferences Attended

Combinatorics on Words, Centre International de Rencontres Mathématiques, Spring 2016.^I
 AMS Spring Southeastern Sectional Meeting, Spring 2016.^I
 Rocky Mountain Dynamical Systems Conference, Summer 2015.
 Workshop in Dynamical Systems and Related Topics, Penn State University, Fall 2014.^I
 Rice Dynamics Meetings, Rice University, Spring 2014.^I
 Workshop on Dynamical Systems and Related Topics, University of Maryland, Spring 2014.^I
 Geometric Structures in Low-Dimensional Dynamics, Brown University, Fall 2013.^P
 PIMS Summer School in Probability, University of Washington, Summer 2010.
 Geometry and Dynamics of Teichmüller Spaces, Main Conference, Hausdorff Research Institute for
 Mathematics, Summer 2010.
 Texas Geometry and Topology Conference, Rice University, Fall 2009.

^IInvited Speaker. ^PParticipated in Poster Session.

Invited Lectures

- Ergodic Measures for (sub)shifts with eventually constant complexity growth,*
 University of Texas at Dallas, April 22, 2016.
 Centre International de Rencontres Mathématiques, March 17, 2016.
 Georgia Institute of Technology, November 6, 2015.
 University of Maryland, September 10, 2015.
- Bufetov's question on Rauzy induction and self-similar interval exchange transformations,*
 Fédération de Recherche des Unités de Mathématiques de Marseille, March 18, 2016.
- The number of ergodic measures for minimal shifts of low complexity II - shifts related to interval exchange transformations,*
 AMS Spring Southeastern Sectional Meeting, March 5, 2016.
- Interval Exchange Transformations and Similar Shifts,*
 University of North Texas, November 2, 2015.
- Boshernitzan's Bound for Shifts with Eventually Constant Growth,*
 Northwestern University, May 12, 2015.
- A Bound of Boshernitzan,*
 University of Utah, April 22, 2015.
 Graduate Center of City University of New York, April 17, 2015.
 Rice University, March 17, 2015.
- On Rauzy Induction: A Quantitative Answer to Bufetov's Question,*
 Penn State University, February 2, 2015.
- Topological Mixing for some Residual Sets of Interval Exchange Transformations,*
 Rice University, April 26, 2014.
 University of Maryland, April 11, 2014.
- Labeled and Unlabeled Extended Rauzy Classes,*
 Rice University, March 14, 2014.
- What can a transformation's language tell us?*
 Princeton University Mathematics Competition, November 16, 2013.
- Topological Mixing for some Residual Sets of Interval Exchange Transformations,*
 Yale University, November 11, 2013.
- Minimal and Very Non-uniquely Ergodic Interval Exchange Transformations,*
 University of Chicago, November 14, 2011.
 Rice University, June 14, 2011.
- Self-Inverses in Rauzy Classes,*
 University of Houston, March 23, 2011.

Teaching Experience

Advising (Princeton University)

Casandra Monroe, Class of 2018.

Mellon Mays Fellowship advisor.

Billy Fang, Class of 2015.

Criteria for Unique Ergodicity of Symbolic Dynamical Systems, senior thesis.

Graduate student in statistics at University of California, Berkeley.

Russell Jack Jenkins, Class of 2015.

Bufetov's Question for General Products, senior thesis.

Pre-medical postbacc student at Bennington College.

Former business analyst at CPSG Partners.

George Kerchev, Class of 2014.

On the asymptotic behavior of functions arising from the Ising model, senior thesis.

Graduate student in mathematics at Georgia Institute of Technology.

Jane Wang, Class of 2014.

Almost strong mixing group actions in topological dynamics, senior thesis.

Graduate student in mathematics at Massachusetts Institute of Technology.

Courses (Princeton University)

Calculus I, Fall 2011, 2012^H, 2014^H, 2015^H, 2016^H, 2017^H.

Calculus II, Spring 2017^H.

Theory of Games, Spring 2016^S, 2017^S, 2018^S.

Problem Solving in Mathematics^D, Summer 2012^H, 2013^H, 2014^H.

Analysis in a Single Variable, Spring 2014^S.

Junior Seminar: Ergodic and Dynamic Properties of Shift Spaces^D, Spring 2014.

Complex Analysis with Applications, Fall 2013^S.

Analysis I: Fourier Series and Partial Differential Equations, Spring 2013^S.

Advanced Linear Algebra with Applications, Spring 2012.

^DDesigned course.

^HCourse head of multisection course: organized syllabus and course schedule, coordinated with other instructors, maintained course website, prepared own lectures, compiled and organized exams, graded quizzes and helped grade exams, gave regular office hours.

^SSole instructor: organized syllabus and course schedule, maintained course website, prepared own lectures, compiled and organized exams, graded quizzes (when applicable) and helped grade exams, gave regular office hours.

Courses (Rice University)

Multivariable Calculus, Summer 2008, 2009.

VIGRE Seminar: Interval Exchange Transformations and Unique Ergodicity, Spring 2009.

Differential Equations, Fall 2008.

Lectures (Rice University)

Self-Inverses in Rauzy Classes,

Current Mathematics Seminar, October 28, 2010.

Ergodic Decomposition of G -invariant Measures,

Current Mathematics Seminar, March 18, 2010.

Every Rauzy Class Contains A Self-Inverse Permutation,

Spectral Theory Brown Bag Seminar, March 10, 2010.

The Simplicity of the Lyapunov Spectrum for Rauzy Monoids,

Spectral Theory Brown Bag Seminar, October 14 & 21, 2009.

Weak Mixing for Interval Exchange Transformations and Translation Flows,

Spectral Theory Brown Bag Seminar, April 10, 2009.

A Question About Fundamental Regions For Fuchsian Groups,

Spectral Theory Brown Bag Seminar, November 5, 2008.

Teaching Assistant (Rice University)

Integration Theory, Fall 2010^A.

Multivariable Calculus, Spring 2007^{A^O}, 2009^{E^O}, 2010^{E^O}.

Partial Differential Equations, Fall 2007^{A^O}, 2009^{A^{E^O}}.

Differential Equations, Fall 2006^{E^O}, Spring 2008^{E^O}.

^AGraded weekly assignments. ^EGraded exams. ^OHeld weekly help sessions.